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Over the margin,
After it, follow it,
Follow the gleam.

There is a grave danger for the spirit of research when the chief criterion for the advancement of an individual in his position is his ability to turn out voluminous material describing his experiments. This motive prompting the researcher tends more and more to satisfy personal ambition. There will gradually appear a greater amount of polemical writing and controversies over priority of discovery. Nor is this all or the worst of the results attained by such a stimulus to research. Inaccuracies and carelessness in obtaining results are inevitable, it is the logical outcome of a system where bulk and not quality weighs so heavily in seeking promotion. This tendency we are all aware of, not only in individuals but we recognize it as characteristic of nations as well. After all what difference does it make through whom truth is revealed if all can enjoy its fruits?

On the other hand, that land whose cricket and other sports have imbued its citizens with a sense of the "sport for the game's sake" has contributed a succession of epoch makers in the field of science that makes one wonder whence the inspiration of it all. One can not imagine the immortal Newton worrying very much about the status of his position because the first computation concerning the force of gravity due to the earth at the moon did not yield results as he had anticipated. To him and a great host of his fellow countrymen succeeding him it was sufficient to seek first the kingdom of truth, leaving it to others to judge whether the honors of earth, if they had any value, would be added as a natural result of ability. Is it not worth while for us of America, young in the research field, to consider seriously the motives which are to prompt our endeavors in the search for truth? The first motive leads to mediocre results while the latter is characterized by those discoveries which are epoch making. Shall personal ambition or the desire to be "a friend to man" surge

through our endeavors? One class who followed the gleam of truth was hypocritical, men who seemed to have, and wished to seem to have the prestige of scientific distinction without actually possessing it. The other class adopted as their ideal those words which must be the true sentiment of every creative worker in every field of human knowledge:

And only the Master shall praise us, and only the
Master shall blame;
And no one shall work for money, and no one shall
work for fame;
But each for the joy of working, and each, in his
separate star,
Shall draw the Thing as he sees It for the God of
Things as they are."

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THE CONCENTRATION OF HYDROGEN IONS IN THE SOIL

A PAPER with the above title has been published in Danish in the reports from the Carlsberg Laboratory (*Meddelelser fra Carlsberg Laboratoriet*), Vol. 15, Nr. 1. An English edition of this paper will soon be published in *Comptes-Rendus des Travaux du Laboratoire Carlsberg*, Vol. 15, Nr. 1.

The paper contains an account of researches carried on during the years 1916 and 1920 in order to ascertain the importance of the concentration of hydrogen ions with regard to the natural distribution of plants. Analyses were made of a series of Danish plant formations with regard to their botanical constitution, and at the same time samples of the soil were taken from the places in question, and the concentration of hydrogen ions determined. In natural Danish soil it was found to vary from 3.4 to 8.0 as expressed in pH values.

When comparing the botanical analysis of the formations with the physico-chemical analysis of the soil it was immediately seen that there is rather a fixed and constant relationship between the constitution of the vegetation and the concentration of hydrogen ions in the soil, because important variations of the latter are always accompanied by vari-

ations of the constitution of the vegetation when the other factors remain the same, whereas habitats with about the same concentration of hydrogen ions and equal with regard to light and moisture carry about the same vegetation. When the material collected was statistically investigated, it was further proved that many species are only found on soil where the concentration of hydrogen ions is within a certain range of concentration of hydrogen ions characteristic for each single species. Within this is found another range with narrower limits, within which the species has its largest average frequency. It was further proved that it was possible to judge of the concentration of hydrogen ions in the soil from the constitution of the plant formations, when they did not consist of too few species; this holds good, for instance, for meadows.

The number of species found and the density of species (the number of species found on 0.1 sq. m.) were on the whole largest on soil near the neutral point; number of species and density of species become generally less as the concentration of hydrogen ions in the soil increases.

By a series of water-culture experiments it was proved that the species which are found only on very acid soil (acid soil plants) show the strongest growth in culture media with pH values near 4, whereas species which naturally grow only in soils that are neutral or but slightly acid or basic (alkaline soil plants) have the strongest growth in culture media, the pH values of which are between 6 and 7. In the slightly acid culture media in which the basic soil plants have their strongest growth the acid soil plants thrive badly and become chlorotic.

According to the theory of Hartwell and Pember¹ basic soil plants can not thrive in very acid soils, not because these plants can not stand so high a concentration of hydrogen ions as the acid soil plants, but because the

¹ Hartwell, B. L., and Pember, F. R., 1918, "The presence of aluminum as a reason for the difference in the effect of so-called acid soil on barley and rye," *Soil Science*, 6, 259.

very acid soils contain small quantities of dissolved aluminum compounds, which are said to be poisonous for the basic soil plants and not for the acid soil plants. This theory has been proved not to be generally valid, as experiments have shown that aluminum ions are not poisonous for all basic soil plants, generally speaking.

According to Bear² and others acid soil plants can make use of the nitrogen in ammonia, whereas basic soil plants require nitrate nitrogen, which makes it impossible for them to thrive in very acid soil in which nitrification is weak or wanting. Experiments showed that nitrogen from ammonia and from nitrate nitrogen are of the same value for acid soil plants and for basic soil plants, when the plants were cultivated at constant pH. If on the other hand the pH is not kept constant, the plants make the solution more acid, when the source of nitrogen is a salt of ammonia (including thereby ammonia). In this case the basic soil plants soon die, because the solution becomes too acid. The acid soil plants on the other hand last longer as they are more tolerant of acid. If the source of nitrogen is a nitrate (nitrate of ammonia excepted), the plants make the solution more alkaline and the plants die, after having first become chlorotic. The chlorosis takes place for acid soil plants when the pH value of the culture medium has reached 6.0, but for basic soil plants not till of about 7.0.

The investigations prove that the quantity of nutritive substances does not largely influence the distribution of plants. This is opposed to the results of some investigators, who consider that the acid soils are poor and the neutral and basic soils rich in such substances. It has been proved that basic soils exist which are very poor in nutritive substances, and their vegetation does not resemble that of very acid soils, which are poor in nutritive substances.

² Bear, F. E., 1917, "A correlation between bacterial activity and lime requirement of soils," *Soil Science*, 4, 435.

It is therefore probable that the concentration of hydrogen ions of the soils has a direct rather than an indirect influence on the constitution of the vegetation.

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THE PRESENT STATUS OF THE CONCILIIUM BIBLIOGRAPHICUM

PROFESSOR HENRY WARD's appreciative account of Dr. H. H. Field and his self-sacrificing work in connection with the founding and maintenance of the Concilium Bibliographicum suggests to me to make a brief statement concerning the present status of the Concilium.

I spent several weeks in July and August of this summer in a personal examination, in Zurich, of Concilium affairs, representing the National Research Council and the Rockefeller Foundation. The Council has had for some time, during the latter months of Dr. Field's life-time and since his death, in consideration the possibility of extending some aid for the maintenance and further development of the Concilium. The Foundation has manifested a similar interest with a tangible expression of it by two appropriations to assist in meeting the current expenses of the Concilium in 1920 and 1921.

On arrival in Zurich I found Concilium matters in a critical situation. Dr. Field's patriotic activities during the war had left him but little time to devote to the Concilium, and the disastrous results of war-time and after-war conditions on such international organizations as the Concilium had left things in very bad shape. Dr. Field's sudden death prevented him from even beginning a serious rehabilitation of Concilium work and finances.

After many conferences with Mrs. Field and her business friends, with Fraülein Rühl who for twenty years has been Dr. Field's chief technical assistant and was practically the only member of the Concilium staff still giving full time to its affairs, and with an official representative of the Swiss Natural Science Association, which under the terms

of Dr. Field's will becomes, under certain conditions, the legatee of Dr. Field's financial interest in the Concilium, and after long and difficult examination of the business books and memoranda of the Concilium, I arranged to set up a provisional reorganization of the Concilium under the acting directorship, until January 1, 1922, without salary, of Professor J. Strohl, of the Zoological Institute of the University of Zurich.

This temporary reorganization will allow some of the most needed work of the Concilium to go forward, supported financially by the subsidies of the Swiss Government, the city of Zurich and the Rockefeller Foundation.

The Concilium, which from the business point of view, is a non-profit taking company, most of whose shares belong to the Field estate, owns an equity of some value in the building at 79 Hofstrasse which for several years has been the Concilium offices and printing rooms. It also has some assets in the way of many already printed cards, some little stock of paper, some office furniture, type and printing presses, etc. But most importantly its assets are its "good will" and subscription list. This list must have immediate attention and revision and that is part of the work now being done under the provisional arrangement.

Professor Ward and other American biologists may be assured that the Concilium is not being allowed to go to pieces without some positive efforts being exerted to save it. It is not yet time, but soon will be, for a definite statement to be issued to the American subscribers to the Concilium cards, which, I hope, will not have to include a direct appeal for money for the support of the Concilium but will appeal for a renewed interest in, and support of the organization, to be manifested by a confirmation of old subscriptions and an addition of new ones. I was much interested to discover from examination of the subscription lists that one third of all the Concilium subscribers are American.

VERNON KELLOGG

NATIONAL RESEARCH COUNCIL